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Landscapes

Introduction

In 1996 the Government of the Northwest Territories and the Government of Canada made a joint commitment to prepare a Protected Areas Strategy for the Northwest Territories by the end of 1998, with implementation to be underway by the year 2000.

Protected areas strategies have been developed for most jurisdictions in Canada. These other strategies provide an opportunity to learn from what has been done elsewhere. However, it is important that a Protected Areas Strategy for the Northwest Territories be developed in the Northwest Territories so that it meets the needs and expectations of northern interests. The participation of Aboriginal organizations, claims-based resource planning, and management boards is crucial to developing a protected areas strategy for the Northwest Territories. In addition, the strategy will need to be shaped by input from industry, environmental organizations, and other interested parties.

A number of protected areas already exist in the Northwest Territories. National parks are protected areas, as may be national wildlife areas, migratory bird sanctuaries, and some territorial parks. The Northwest Territories Protected Areas Strategy will evaluate the natural features, landscapes and biological resources already being managed in existing protected areas, identify new proposals to complement these areas, and fill gaps to ensure that the wide range of natural diversity in the Northwest Territories is represented in a network of protected natural areas.

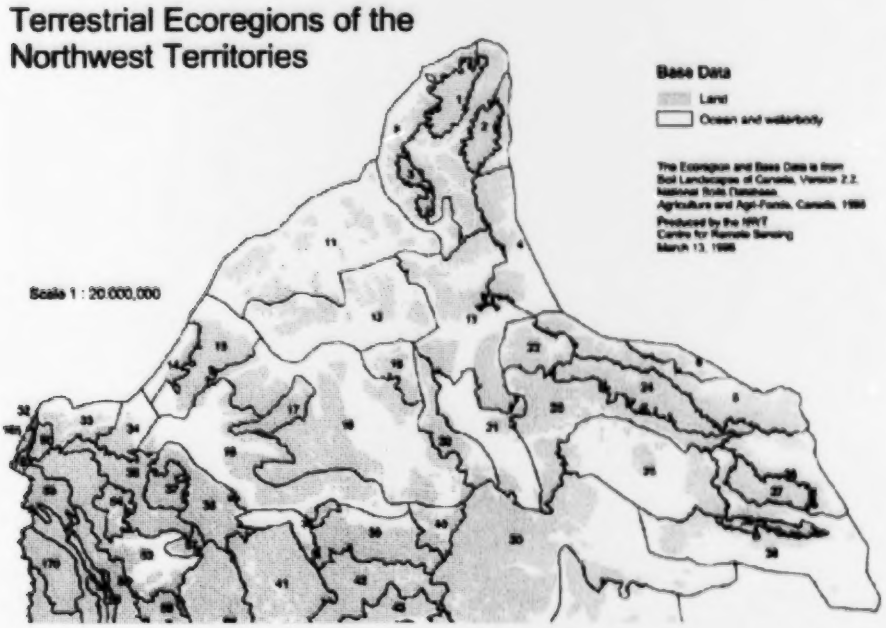
The purpose of an ecologically-based approach for the Northwest Territories Protected Areas Strategy is:
i) to identify the requirements for protecting representative samples of northern lands and waters and
ii) to help select and design a network of protected natural areas that will conserve natural processes and maintain healthy ecosystems.

Ecological Concept of Protected Natural Areas

Although a range of social, economic and environmental considerations will influence the development and implementation of the Northwest Territories Protected Areas Strategy, sound ecological criteria should play an essential role in establishing a network of protected natural areas in the Northwest Territories. The Canadian Environmental Advisory Council in 1991 recommended that a key component of a network of protected areas in Canada should be:

"to establish large, major ecosystem reserves within each biogeographic division or natural (eco) region. These reserves should include a continuum of many habitat types and preserve the most biologically productive and diverse examples of those habitats. Priority must be placed on protecting representative natural areas. They are the cornerstones of a network of protected areas because of their significant contribution to conserving biological diversity and sustaining ecological processes."

Establishing representative protected natural areas in each ecoregion will enhance the conservation of biological diversity in the Northwest Territories. The protection of appropriate representative habitats will serve to protect the Northwest Territories diversity of wildlife species and the ecological processes supporting them. Further, a system of protected natural areas combined with well-managed surrounding lands and waters also provides a framework for ecologically sustainable development.



Terrestrial Ecoregions of the Northwest Territories

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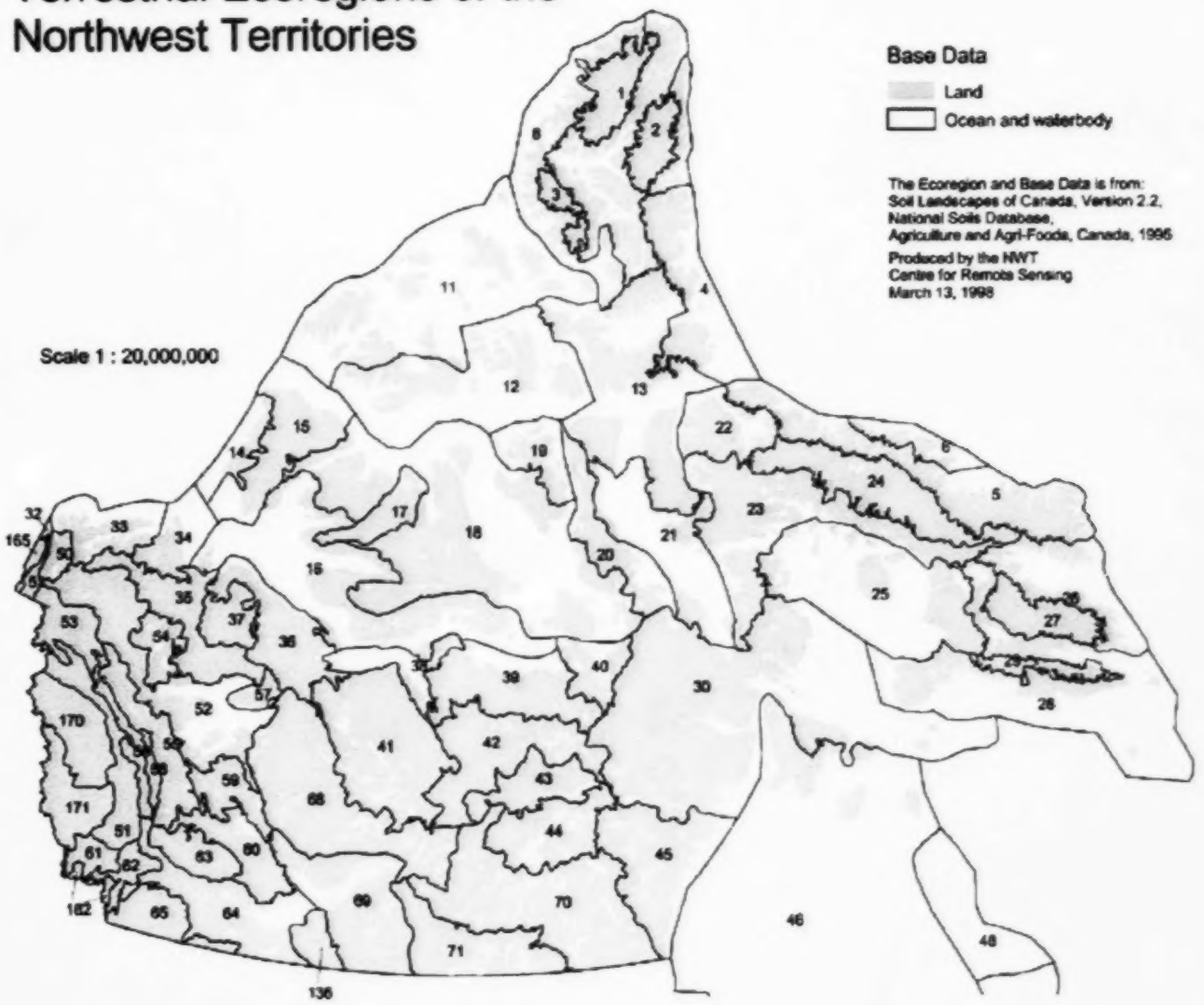

1 - 4	Ellesmere and Devon Islands Ice Caps	25	Foxe Basin Plain				
5	Baffin Mountains	26	Pangnirtung Upland				
6	Baffin Island Coastal Lowlands	27	Hall Peninsula Upland				
		28	Meta Incognita Peninsula				
8 , 10	Ellesmere Mountains	29	Baffin Upland				
9	Eureka Hills	30	Wager Bay Plateau				
11	Sverdrup Islands Lowland	32	Yukon Coastal Plain	48	Ottawa Islands	63	Horn Plateau
12	Parry Islands Plateau	33	Tuktoyaktuk Coastal Plain	49	Belcher Islands	64	Hay River Lowland
13	Lancaster Plateau	34	Anderson River Plain	50	Mackenzie Delta	65	Northern Alberta Uplands
14	Banks Island Coastal Plain	35	Dease Arm Plain	51	Peel River Plateau	68	Coppermine River Upland
15	Banks Island Lowland	36	Coronation Hills	52	Great Bear Lake Plain	69	Tazin Lake Upland
16	Amundsen Gulf Lowlands	37	Bluenose Lake Plain	53	Fort McPherson Plain	70	Kazan River Upland
17	Shaler Mountains	38	Bathurst Hills	54	Colville Hills	71	Selwyn Lake Upland
18	Victoria Islands Lowlands	39	Queen Maud Gulf Lowland	55	Norman Range	136	Slave River Lowland
19	Prince of Wales Island Lowland	40	Chantrey Inlet Lowland	56	Mackenzie River Plain	165	British-Richardson Mountains
20	Boothia Peninsula Plateau	41	Takijuq Lake Upland	57	Grandin Plains		
21	Gulf of Boothia Plain	42	Garry Lake Lowland	58	Franklin Mountains	170	Mackenzie Mountains
22	Borden Peninsula Plateau	43	Back River Plain	59	Keller Lake Plain	171	Selwyn Mountains
23	Melville Peninsula Plateau	44	Dubawnt Lake Plain/Upland	60	Great Slave Lake Plain	182	Hyland Highland
24	Baffin Island Uplands	45	Maguse River Upland	61	Nahanni Plateau	216	Hudson Bay Lowland
		46	Southampton Island Plain	62	Sibbeston Lake Plain	217	James Bay Lowland

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Representation as a Basis for Protection

Strategies to establish networks of protected natural areas exist for most Canadian provinces. The remaining jurisdictions, including the Yukon and the Northwest Territories, are currently in the process of developing strategies. Most jurisdictions with protected areas strategies in place have adopted the Terrestrial Ecoregions of Canada, which is a national system of ecological land classification. Initially developed by the federal government, it describes a common basis for climate and landforms across Canada.

Where necessary, jurisdictions have modified this system to reflect their particular situation, while ensuring that their approach remains compatible with conservation initiatives involving more than one jurisdiction. Given that the Northwest Territories shares borders with eight other jurisdictions, it is important that the approach adopted by the Northwest Territories Protected Areas Strategy is compatible with approaches used elsewhere.

Under the *Terrestrial Ecoregions of Canada*, the Northwest Territories is divided into 9 ecozones and 69 ecoregions. Ecozones are at the top of the ecological hierarchy and represent large-scale and very generalized climatic and physiographic features. Each ecozone is subdivided into a number of ecoregions, which are characterized by a unique combination of landforms, soil types, and climate. They typically reflect climatically related natural vegetation and animal communities.

Randomly selecting protected natural areas in ecoregions is unlikely to represent the Northwest Territories biological diversity. Therefore a method of assessing whether this diversity is represented in each ecoregion is necessary. Experience of other jurisdictions, as well as that of non-government organizations like World Wildlife Fund (Canada) and the Canadian Parks and Wilderness Society suggests that a "landscape unit" approach is a good "coarse filter" to identify ecologically distinct sites and the biological diversity associated with these sites.

. Although representation is not the only way to propose areas for protection, it does provide an objective and consistent way to identify habitats that need to be included in a network Landscape units are relatively uniform areas of rock, soil, and surface form that support localized unique plant and animal communities, and are generally considered to be the building blocks of biological diversity. Unlike plants and animals that can be damaged by human activities or natural events such as fire, landscape units persist over long periods of time. To conserve the biological diversity within each ecoregion, representative samples of landscape units should be protected. In this way, the full range of landforms, natural processes, and resulting habitats, and the plants and animals linked to those habitats will also be protected.

Representation is the underlying principle for designating protected natural areas throughout Canada. It is a measure of how protected natural areas portray the physiographic and biological diversity of ecoregionsof protected natural areas. Appropriate application of the principle of representation would help establish a network of protected natural areas reflecting the diversity of landscapes, plants, and animals of the Northwest Territories.

Therefore, the Northwest Territories Protected Areas Strategy proposes that an effective network of protected natural areas should contain samples of self-sustaining landscape units, ie. the proportions and location of protected natural areas should reflect the relative proportions and location of landscape units within ecoregions.

Assessing Landscape Unit Representation

Assessing representation first requires the identification of landscape units that characterize ecoregions. It is then necessary to determine whether or not existing protected areas adequately represent these characteristic landscape units and if other areas are needed to provide long-term protection of regional biological diversity.

Ideally, the full range of biophysical elements related to climate, geology, landforms, soils, vegetation, and wildlife are needed to adequately characterize ecoregions. However, given the huge and varied nature of the Northwest Territories and the limited amount of information available, it seems appropriate that the Northwest Territories base its strategy on methods similar to those used by other jurisdictions, and use representative landscape units as a first approximation of biological diversity.

Ecoregions 41 and 68 - Takijuq Lake Upland and Coppermine River Upland Landscape Units

Landscape Units

- A/4
- Gx/9
- Gx/4
- R/4
- R/4.R2
- R/4.R4
- R/8
- R/9
- R/P
- R/R2
- R/R4
- Tb/4
- Tb/8
- Tb/P
- Tb/R4
- Tw/4
- Tw/4.R2
- Tw/4.R4
- Tw/8
- Tw/9
- Tw/P
- Tw/R2
- Tw/R4
- fL/4
- fL/9

Modifying Features

- Eskers
- Drumlins

Ecoregion boundary

Base Data

- Ocean
- Waterbody

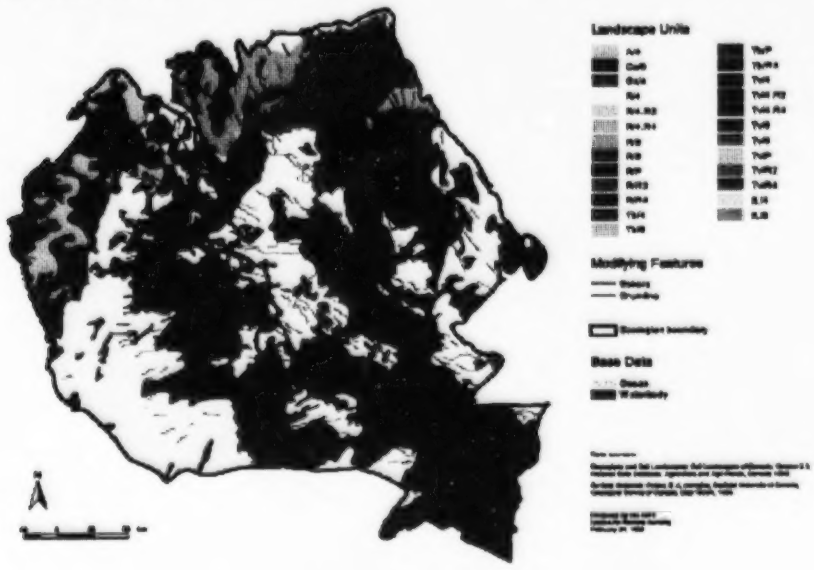
Data sources:

Ecoregions and Soil Landscapes: Soil Landscapes of Canada, Version 2.2, National Soils Database, Agriculture and Agri-Foods, Canada, 1998

Surficial Materials: Fulton, R.J., compiler, Surficial Materials of Canada, Geological Survey of Canada, Map 1880A, 1998

Produced by the NWT Centre for Remote Sensing
February 24, 1999

Ecoregions 41 and 68 - Takijuq Lake Upland and Coppermine River Upland Landscape Units



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Identification of Landscape Units

To identify landscape units within ecoregions, the Northwest Territories Protected Areas Strategy will use the combined characteristics of surficial geological deposits, soils, and modifying terrain features.

Map overlay data sources are Natural Resources Canada for surficial geological deposits and modifying terrain features (1:5 million scale), Environment Canada for ecoregions (1:1 million scale), and Agriculture and Agri-Foods Canada for soils (1:1 million scale). The 1:1 million scale has generally been adopted as appropriate for regional analysis and provides a coarse filter for the identification of gaps in existing systems of protected natural areas. A Northwest Territories wide surficial deposits dataset is not available at a 1:1 million scale, therefore a coarser scale dataset is used.

For soils the major characteristic, soil development is used to identify landscape units. Two other soil characteristics, kind of material and parent material are used to further differentiate bedrock and organic soils. It may be necessary in future to include further soil characteristics such as soil texture and local surface form.

Landscape units are created by preparing map overlays of ecoregions, surficial geological deposits, soils, and modifying terrain features such as eskers, drumlins, or moraines, using a Geographic Information System. Within each ecoregion, landscape units are described by up to three codes identifying the surficial geological deposit, predominant soil type, and when present, a modifying terrain feature. Landscape unit codes for the Northwest Territories are explained in the accompanying table. Assessing Representation

The Northwest Territories proposes to use the following guidelines developed by the province of Manitoba to assess whether landscape units are adequately represented in ecoregions, given that landscape units vary in size and location within them.

Small Landscape Units (<10,000 hectares)

1. Adequate representation for landscape units in this category may require that the entire landscape unit be protected. This is especially true for landscape units that are smaller than 1,000 hectares.
2. For landscape units that occur at various locations within the ecoregion it is preferable to have one or more complete units protected.
3. Adequate representation of small landscape units requires that these be embedded within larger protected areas, in order to conserve their habitat integrity.
4. The habitat integrity of small landscape units is often determined by the nature of surrounding landscape units. Adequate representation therefore requires the protection of adjacent landscape units to preserve the integrity of the smaller unit.

Medium Landscape Units (10,000-500,000 hectares)

1. Adequate representation for landscape units in this category may be achieved by protecting portions of the landscape units that will maintain habitat integrity, as well as reflect their distribution within the ecoregion.
2. For landscape units that occur at various locations within the ecoregion, adequate representation may require that one complete unit is protected. For the larger landscape units, it may be sufficient to protect a significant

portion of the unit.
3. Medium-sized landscape units are less vulnerable to loss of habitat integrity, and representative units may lie inside, along the boundary of protected natural areas.
4. The protection of adjacent landscape units may be required for adequate representation if there are significant links with these that enhance the habitat integrity of the unit.

Large Landscape Units (>500,000 hectares)

1. Adequate representation for landscape units in this category may be achieved by protecting a portion of the landscape unit in one or more protected natural areas that are each larger than 100,000 hectares.
2. For landscape units that occur at various locations within the ecoregion, adequate representation generally requires that only a significant portion of each unit be protected.
3. Large landscape units are least vulnerable to loss of habitat integrity, and protected natural areas representing these may have small-protected landscape units embedded within them.
4. The protection of adjacent landscape units may be required for adequate representation only if there are significant links with these that enhance the habitat integrity of the unit.

Selection and Design of Protected Natural Areas

Using representative landscape units to identify protected natural areas in ecoregions provides a "coarse filter" analysis of biological diversity. Once the mapping of landscape units is complete and an assessment of the level of representation within ecoregions has been conducted, guidelines for maintaining ecological integrity are required to help locate and design boundaries for protected natural areas. Additional "fine filter" considerations such as occurrences of rare and endangered plant and animal species or communities, areas of high species diversity, habitats that are particularly susceptible to disturbance and unique geological and physical features that affect biological diversity will be included.

Some useful ecological criteria for the location, boundaries and design of protected natural areas in the Northwest Territories are summarized below. They are adapted from observations by Reed Noss, a pre-eminent North American conservation biologist.

1. Undeveloped areas of significant size, ie. greater than 500,000 hectares.

Large, undeveloped areas offer important refuges for species sensitive to human activities. Protected natural areas should be large enough to allow natural processes to take place, as well as to allow wide-ranging species, such as caribou or grizzly bears to survive. Where possible, one large area, which would likely include several landscape units, is the best way to meet these needs. Where this is not feasible, a series of protected natural areas linked by corridors may provide an alternative.

2. Watersheds, wetlands, and estuaries of importance for fish or other elements of aquatic biodiversity.

3. Concentrated occurrences of rare species, or rare or unusual plant or animal communities.

On a regional scale, unique locations of species are obvious "hot spots" of biodiversity that should be included within protected natural areas. However in most regions of the Northwest Territories, information on rare species occurrence is incomplete.

4. Areas of unusually high primary productivity or number of species.

These areas are generally correlated with areas of high physical habitat variety, high-energy flow or unusual parent soil material, such as springs and mineral licks.

5. Locations of animal concentration areas or important phases of their life cycle.

These include bird breeding sites, ungulate winter range or calving grounds, or carnivore denning areas.

Conclusion

Simply protecting representative natural areas in each ecoregion will not guarantee that all species native to the region will survive, or be able to migrate elsewhere when conditions change. Nor do protected natural areas by themselves ensure that large-scale ecological processes such as fire, required for productive wildlife habitat, will be maintained. In a region with undisturbed habitat, protected natural areas that adequately represent landscape units are likely to maintain wildlife species as long as surrounding areas also remain undisturbed. By contrast, protected natural areas in ecoregions that are being significantly modified by activities associated with economic development may be less effective in protecting species and natural systems. In such cases the effectiveness of protected natural areas can be strengthened if the impacts from these activities in the larger surrounding areas can be minimized. Ultimately however, the sampled representation of biological diversity that protected natural areas provide must be accompanied by sustainable land and resource management outside protected natural areas.

* Paper entitled Maintaining Ecological Integrity in Representative Reserve Networks (1995)

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